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AN ENTOMOLOGICAL CROSS-SECTION OF THE UNITED STATES. III

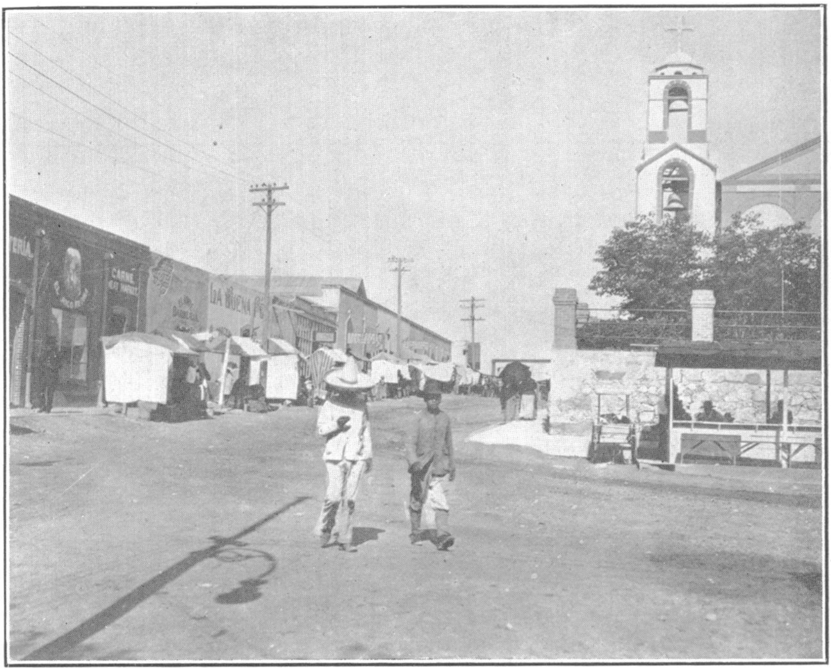
By Professor J. CHESTER BRADLEY
CORNELL UNIVERSITY

From the west slope of the Dragoon Mountains the valley of the San Pedro came suddenly into view below us, an exhilarating sight. Some nests of *Atta*, the leaf-cutter ant, were on the hills. It had been raining, the road was steep and slippery, the slope on the outside precipitous and unguarded and the cars inclined to skid, especially the Buick with the trailer behind. We put on chains and descended carefully. At the bottom the bridge over the river gave us concern. Its foundation had been washed out a couple of days before, and it was in a very unsafe condition for heavily loaded cars. We crossed slowly but safely, dragging the trailer across by hand. In the mesa west of Vail on greasewood, *Covillea argentata,* I found considerable *Tachardia larreæ,* the American lac insect.

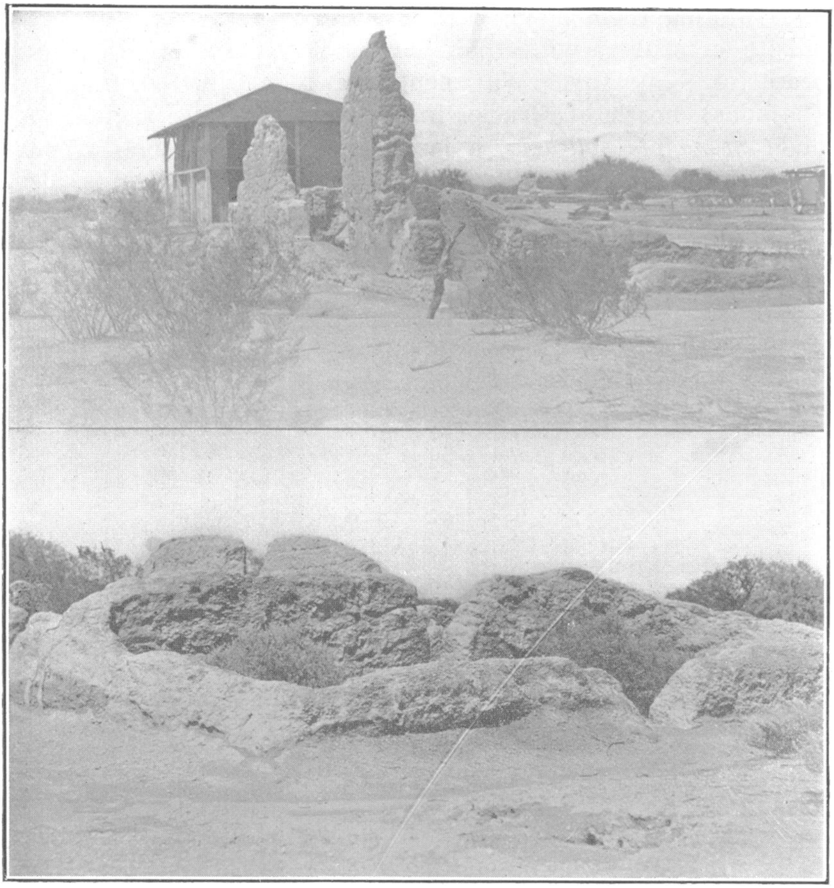
At Tucson we were welcomed by Professor Freeman, of the Genetics Department of the State College, and others, and invited to camp on Professor Freeman's premises, an invitation which we gratefully accepted. In company with Dr. and Mrs. Forest Shreve, of the Desert Botanical Laboratory, we made a most interesting trip to Sabinal Cañon. The large dytiscid, *Thermonectes marmoratus* Hope, elegant in its gorgeous orange-spotted livery, was rather common. Knight took five males of a new tibicen which Mr. Davis has since described and dedicated to him, *Tibicen knighti.* It had an unusual song, resembling, according to Knight, the loud rasping of an acridid grasshopper.

Another interesting trip from Tucson was to the fine old Mission San Xavier del Baç founded in 1692. In the garden, on cacti, were quite a number of curious black longicorns of the genus *Monilema* (*M. grandis*), looking like large pinacate beetles (*Eleodes*) out of place. They represented the third species of these rare beetles that we had captured.

North of Tucson lie the Santa Catalina Mountains, a well-forested range, culminating in Mt. Lemon at an altitude of about 10,000 feet. We planned for a three days' trip to high altitudes, partly by machine and partly by pack animals. Driving by night, we surprised numerous jerboas, and were able to capture quite a number, shining a flashlight upon them and running them down with a butterfly net. They are exquisite creatures, with their large eyes, ears and tail and beautiful silky fur. We spent the night in the foothills (bajadas) north of Oracle, in a very attractive region. A male *Stenaspis solitaria,* a large longicorn, was one of our good captures there; *Plateros nigerrimus* Schaeffer is also worthy of mention. The road up the mountain was badly washed, full of very steep pitches, and altogether a terrible road. By dint of walking and pushing we got within two miles of the end, then had to abandon the trailer and Fords, but the Buick stuck it out to the finish. There the packers took charge of our outfit, carrying it up to Webber's camp in the pines, where we stayed two days. On the way up we encountered a terrific hail storm, accompanied by very severe lightning. Knight, Needham and myself were caught on an exposed slope, and crouching beneath some bushes were peltered with stinging hail the size of peas. In a few minutes the ground was white. Then, amongst the smaller hail, began to come at intervals great stones, the size of eggs. In all this misery our attention was attracted by what seemed like some one throwing rocks, but we soon discovered that they were conglomerations



JUAREZ, MEXICO. Dressed in khaki, some of the boys crossing over into Mexico were mistaken for soldiers and got into trouble.



CASA GRANDE, the ruins of a prehistoric civilization near Florence, Arizona. The most perfect building has been covered with a shed by the government, for protection. In it we found quarts of dead and dying winged harvester ants.

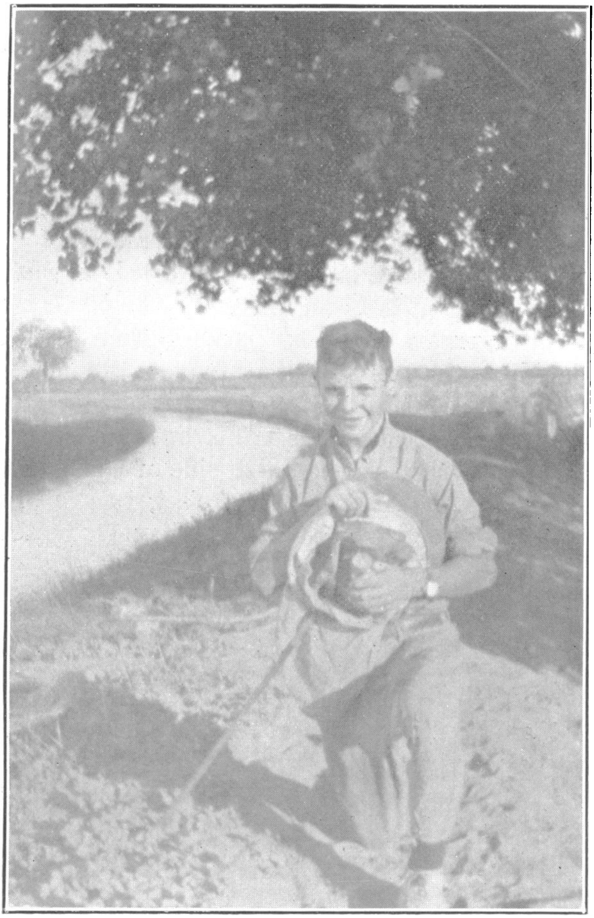
of hail stones, which hit the earth here and there with a crash and broke into fragments. Arrived at camp, a cabin was most kindly placed at our disposal and we were soon dry and comfortable. Next morning most of the party went to the summit, but I contented myself with the collecting in the transition forests around Webber's camp. Mr. Knight collected three new species each of *Platylygus* and of *Camtobrochis* from the pine trees on the very summit, and near our camp a new *Lopidae*. The horned toad up there on the mountain is the red-headed *Phrynosoma hernandesi,* while down at Oracle we found another species, with a circle of enormous spines around its head, from which its name, *P. solarie.* Dr. Wright induced a specimen of the latter to eject blood from the sinus of its eye, a habit of horned toads well known to dwellers in the west, but the existence of which has, nevertheless, been frequently disputed by herpetologists. Presumably it is a means of defense by terrorizing the aggressor, or it may be merely an apoplectic sort of phenomenon which occurs under the pressure of severe fright.

The Santa Catalina Mountains are about the most readily accessible of the desert ranges of southern Arizona. There is a summer settlement of cottages in the pines known locally as Summer Haven marked on the U. S. Geological Survey maps as Webber's Cabin. It is at an altitude of 8,000 feet above the sea. Regular trips are made by packers from Tucson up the steep south side of the mountain to this place during the season, and outfits may be sent up at so much per pound. Those who go up by foot or burro use this trail; but an auto road leads around by way of Oracle to the north side of the mountain, and thence up it, to an elevation of 6,000 feet, two or three miles only from Summer Haven. A new and much better road is being built, via this north side.

On the morning of July 29, near our camp in the outskirts of Florence, we found *Tibicen cinctifera* Uhler, very abundant on mesquite. The song is a continuous moderately shrill note, as recorded by Knight. This same species was found common as far west as Phœnix and northward to the Grand Cañon. Near Florence we visited the Casa Grande ruins, preserved by the federal government as a national monument. They are interesting relics of a prehistoric civilization. Within one of the chambers we found on the floor literally quarts of the freshly dead bodies of male harvester ants (*Pogonomyrmex barbatus rugosus* Emery). Dr. Morgan caught a beautiful specimen of the leopard lizard, *Crotophytus wislizenii*, a big-headed, mottled fellow, in a ditch close by our camp.

That afternoon the crossing of the Gila River, which was in flood, lent variety to our experience. The cars were driven up on to flat wagons, and we in them were carted across in style, with all the up-in-the-air sensations of a tally-ho party. On the other side I caught some fine Scoliidæ, and on the flowers of *Sueda*, three specimens of a *Parnopes* (cuckoo wasps). That night we camped on the desert, near a stand of giant cacti and tried their fruit as a delicacy.

The collecting at night was excellent, but the mosquitoes were unbearable, and the night suffocatingly hot. Four o'clock found us astir, ready for a quick departure. We witnessed a sight which has rarely been observed by entomologists, the nuptial swarming of the leaf-cutter ant, *Atta versicolor*. The air was full of them, and they congregated in great masses



OUR YOUNGEST: THE BUTTERFLY BOY. Photograph by R. C. Shannon.

along the sides of the road. Recent rains had flooded the country, and our progress for several miles was exceedingly difficult, through bad mudholes of a very trying nature. Dr. Wheeler has recorded this occurrence and also other marriage flights of ants observed on the trip, notably *Pogonomyrmex barbatus rugosus* at Casa Grande, *P. b. molifaciens* at Tempe, and *P.* (*Ephebomyrmex*) *inberbiculus* at Deming in a paper entitled "Notes on the Marriage Flights of some Sonoran Ants."[3] In another paper, "The Pleometrosis of *Myrmecocystus*,[4] he records another phenomenon which we witnessed later on the same morning. His interesting account will bear repetition here:

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[3] *Psyche*, 1917, 24, 177–180.

[4] *L. c.*, pp. 180–182.

The following observation, made during the past summer while I was with the Cornell Biological Expedition, throws some additional light on primary pleometrosis. On July 29 the heaviest rain in six years fell in Phœnix, Arizona., and temporarily inundated parts of the desert south of that city in the neighborhood of Higley. On July 30 we left our camp about thirty miles north of Florence and proceeded along the road to Phœnix over soil which had been drenched by this rain, with the result that our three motor cars were repeatedly stuck in the mud. While the younger and lustier members of the party were extricating our cars and two others which had been stalled all night in deep puddles, I took advantage of the delay to study the ants along the roadside. Many colonies of various species, whose nests had been inundated, were moving to drier ground. My attention was especially attracted by dozens of incipient nests of *Myrmecocystus melliger* Forel subsp. *mimicus* Wheeler. The large reddish queens had evidently celebrated their nuptial flight immediately after the storm and were now busily digging into the wet adobe soil, making small craters about two inches in diameter with eccentric opening. The wall of the craters consisted of small pellets about one eighth of an inch in diameter, evidently carried up in the psammophore, or crate of peculiar stiff hairs with which the gular surface of the head is furnished in these ants. On seizing a queen just as she was carrying out and dropping her pellet on the wall of the crater I was surprised to see another queen leave the entrance with a similar burden. This led me to examine some twenty nests—all, in fact, that I had time to excavate before I was obliged to proceed with the party. My rather hurried observations showed that about half of the craters had been established by single queens, but that the others were each the work of two cooperating queens. One crater actually contained five queens, four dealated and one with intact wings! It appears, therefore, that about 50 per cent. of the colonies of *mimicus* are pleometrotic in origin [that is normally have several queens]. That they probably remain so is indicated by the fact that on former excursions in Arizona I have on several occasions taken more than one dealated queen from a single adult colony of this ant.

While the recent rains impeded our progress, it is undoubtedly the case that the excellent collecting which we had been experiencing throughout eastern Arizona was due largely to the fact that the rains at nearly every point had preceded us. An interesting capture in a mudhole of the gutter alongside the road at Higley was the enormous *Bufo alvarius,* a smooth-skinned species which inhabits the Gila and Colorado River valleys. We obtained several individuals.

At Phœnix the party divided for a week. Dr. Wheeler, Dr. Bequaert and myself remained at Tempe, nine miles east of Phœnix, while the others made a quick trip in the Fords to the Grand Cañon. The Federal Bureau of Entomology has a field station at Tempe and the men in charge, Messrs. Hogue and Bailey, made us welcome. The town is in the irrigated Salt River Valley. Along the sands of the river bottom, both here and at Phœnix, curious velvet-ants, *Dasymutilla gloriosa*

Sauss., were abundant. Covered with long erect white pubescence, they look like little balls of fur, or feathery seed capsules of a plant scurrying in the late afternoon, over the sand. In fact, they are undoubtedly mimics of the furry seeds of the abundant greasewood. On the flowers of a small *Euphorbia* (probably *serpyllifolia*) Dr. Bequaert discovered specimens of an exceedingly minute bee. It would crawl swiftly rather than fly, and was quite difficult to catch. I have never seen so small a species of bee. Dr. Bequaert writes me that it probably belongs to an undescribed genus near *Perdita*. He finds no species described as small as ours, or like it. Sunflowers were abundant along the roads and attracted many Hymenoptera, especially innumerable Philanthidæ of several species. We also captured a number of beetles of the curious Meloid genus *Nemognatha* on these flowers. These beetles have long tubular probosces. Fields and groups of other flowers yielded splendid returns in the way of Scoliidæ, Larridæ and other Hymenoptera. Dr. Wheeler found the ant fauna very meager. In fact, collecting on the desert away from the irrigated land was here exceedingly poor, everything being baked and lifeless. *Calephalis perditalis,* which we had taken also previously, was common at Tempe. At that time it was undescribed, but has since been made known, from Texas, by Barnes and McDunnough. At Phœnix I caught, by an arc-light, another enormous *Derobrachus geminatus.*

The party returning from the Grand Cañon, August 6, brought reports of an interesting trip and good collecting. Mr. Shannon obtained still another nemestrinid, probably a *Rhynchocephalus* and a *Cuterebra,* the only adult bot fly taken on the entire trip. Needham found *Papilio daunus* at the cañon.

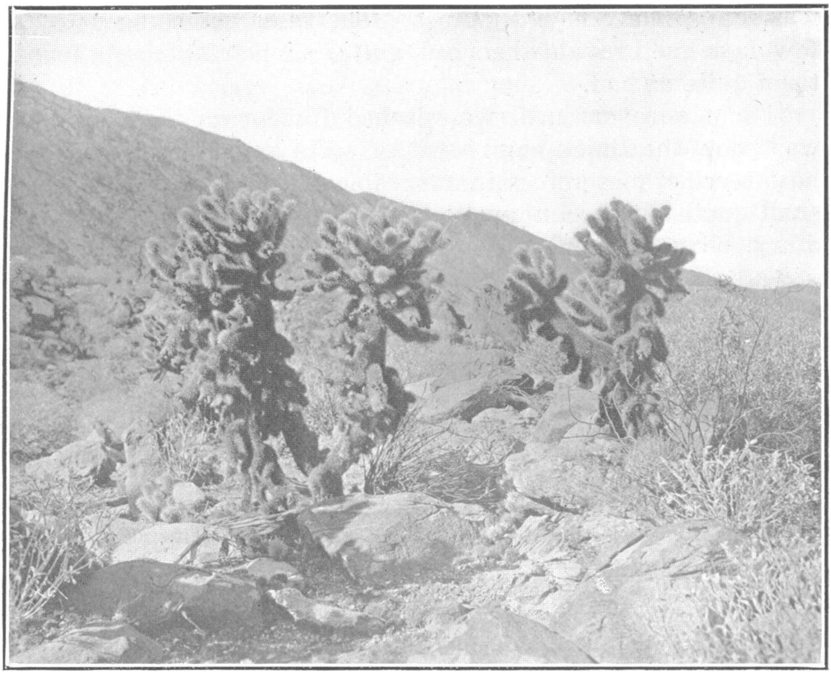
That evening at dusk, we had to cross the Agua Fria as it was receding from flood. The water was almost too deep and the bottom treacherous. The Fords crossed in fine style, but the Buick, rushing across on low gear, under full headway, dropped the forward end of its mudpan just as it reached the deepest part of the river, scooping up the water and sand and pouring it over the engine. The bath was not relished, so the engine promptly struck, and the car stuck. Ralph Wheeler and Shannon, donning a negligée effect, went fishing for the mudpan, while others started off to find a rancher to come down with a team of mules. Presently the engine, beginning to feel ashamed at being peeved by a bath of muddy agua fria, showed signs of an intention to go. We coaxed and it sputtered, but finally ran. "Everybody push," and soon we were out on the western bank—just as the mules arrived. Our camp that night was a nightmare of mosquitoes. The rains preceding us by a few days had brought them out, and the following nights found them quite as bad.

From here on until we reached California the collecting was poor, the Buick engine out of sorts and very cranky, the heat terrific, mosquitoes innumerable and progress doleful. I shall quote an account written by Dr. Morgan in Needham's diary.

> First part of the trip (August 8) was through the Gila Bend Mountains. We dropped gradually to the plain through which the Gila River flows. . . . Through the afternoon we traversed this plain, running through alkali flats and sand. Trouble with the Buick engine all the afternoon, probably sand or water in its alimentary tract. Camped on flat at 7 P.M. Traveller had advised us in the afternoon that Yuma was within one half mile of hell, but we found the spot described far short of Yuma, selecting it as an ideal camping spot for all of us. The mosquito prelude developed great proportions during the night, its music continuing until morning, interrupted only by a brief half hour of sand storm. (During and after the storm, various members of the party were engaged in recovering articles scattered widely over the desert.) During the night and early dawn the party gradually assembled from individual cussing expeditions. Strong coffee, watermelon, cleaning the engine, packing the trailer followed in orderly sequence. Departure at 11:00. Mr. Lobdell failed to appear, and his effects were assembled and conducted to the "John Harvard" (a Ford) by those who stand and wait. Later, Mr. Lobdell still with the birds. The Buick engine has snorted several times successfully.

At the camp which Dr. Morgan thus vividly described, not many miles from Palomas, we found numbers of a large buprestid of the genus *Gyascutus*, probably *G. planicosta* L., on *Covillea*. Also we found our only side-winder and observed with much interest its peculiar rapid lateral progression. The trap-lantern produced very large series of a pretty little white and black noctuid *Conochares arizonæ*, as well as of the brown *Fruva fasciatella;* another rarer species *Conochares hudsoni* was caught more sparingly. These species also turned up at Wellton the following night. The horned toad of this region is *P. platyrhinos*.

The valley of the Gila River merits more attention than we were able to give it, and some suggestions as to convenient places for stopovers may not be amiss to others who may contemplate a trip by rail to Yuma. Agua Caliente, on the river, we reached shortly after coming out of the Gila Bend Mountains the day before, and took lunch at the hotel. The waters are understood to have some medicinal value, and a hotel is maintained for those who may wish to try them. Stage connection is made daily with Sentinel on the Southern Pacific Railway. From general appearance and from the one meal

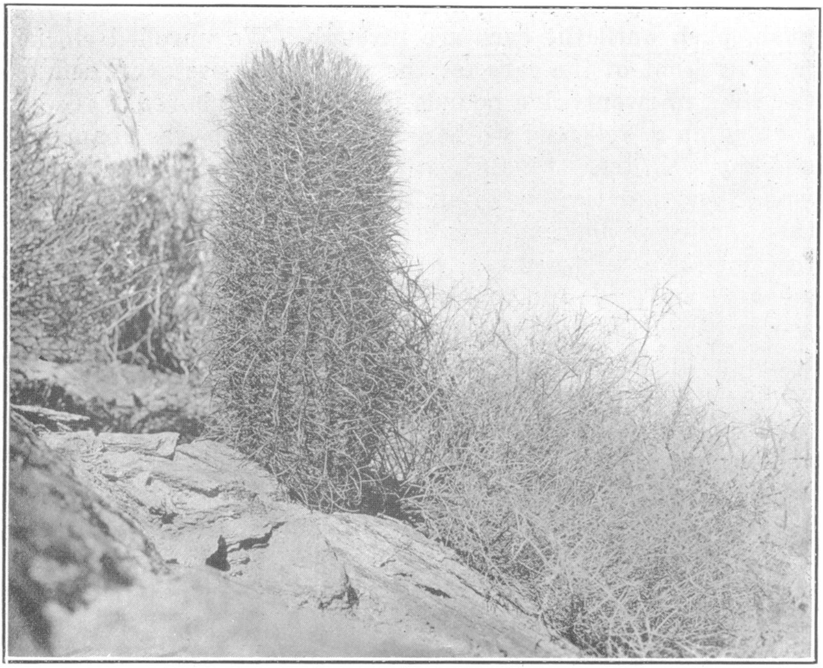


CACTI ON THE COLORADO DESERT. The numerous kinds of cacti are conspicuous features of the rocky and gravelly foothills and minor ridges.

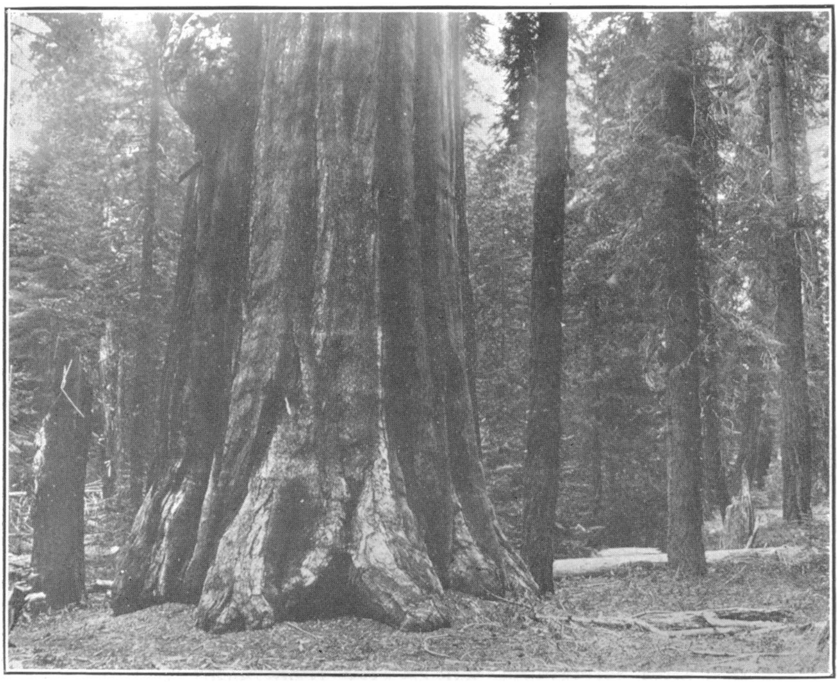
that we had there, I should say that it would be a very comfortable place for a sojourn. As I recall the immediate surroundings, the situation is a mixed gravel and sand wash with rather tall and dense vegetation near the river. Our road paralleled the river on the north side until we came opposite Antelope Hill, where it crosses over a new bridge and in six more miles reaches Wellton, on the Southern Pacific, about thirty miles east of Yuma. There a Mr. Gamble keeps a store and tent-hotel where one can be very comfortable. He bade us welcome, and his shower baths were a very pleasant relief from the intense heat. Many bottles of "pop" mixed with a soft bubble-filled homemade ice were as inwardly refreshing as the showers were externally.

Last spring, very early in May, I stopped again two days at Wellton. On that occasion, on the sand of the desert at night, attracted to an electric flashlight, came scores of males of nocturnal Mutillidæ. My nephew and myself picked up over three hundred in a couple of hours. A trap-lantern obtained as many more, making over six hundred in all. It was necessary only to shine the light on the sand, when presto! they would come, on the instant, tumbling about in quick erratic fashion, now here, now there. That same night I observed six pale green scorpions crawling about over the sand, and a good many chubby pinacate beetles of the genus *Acida.* During the day I walked over toward the river, which is some three or more miles north, and collected many good things along the edge of a field, among which I may mention *Hesperopsis libya,* a skipper, and quantities of a very large and strikingly colored blister beetle, *Tegrodera erosa,* its head bright red and the elytra yellow and coarsely reticulate. Another meloid that I found here in abundance, crawling over the branches of creosote bush (*Covillea agentata*) and eating the flowers, is *Cysteodemus armatus,* entirely black, with reticulate elytra which are inflated like a balloon, making the beetle one of the most grotesque insects that I have seen.

On the late afternoon of August 10, we crossed the Colorado River at Yuma and started westward across the sand hills over the famous plank road, the "board walk" as it is called. No one had been over since the recent severe sandstorm, in fact the route is little used at present. These hills are enormous dunes of shifting sand, at times 200 feet in height. The board walk is like a pavement, where free from sand, but much of the way great drifts of sand have buried it. Then it is push,



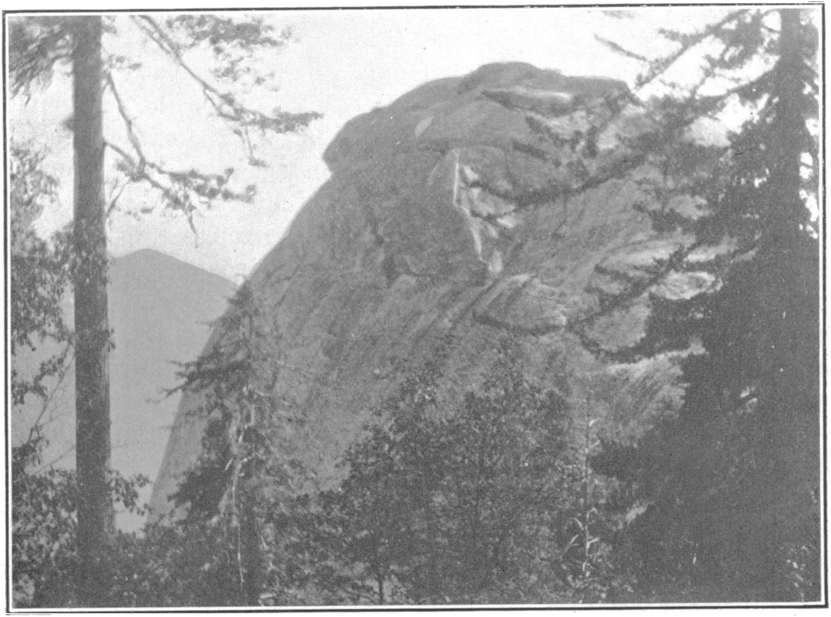
BARREL CACTUS, COLORADO DESERT.



General Sherman, the largest Sequoia. Giant Forest, in the high Sierras, California.

push, push until the cars are through. We unrolled chicken wire in front of the cars for the wheels to pass over, deflated the tires to twenty-five pounds pressure and shoved. We had counted on a well part way over, but the camp was abandoned and the well dry. Finally we reached the end of the "board walk" and practically the end of the road; from here on for thirty miles or more there is no beaten highway, but scattered tracks half a mile across. Each car that has traveled there, and they have been legion, has selected its own mark. These are never obliterated by rain, but together form the road through the interminable sand. For a little way progress would be good, then coming on deep sand we would have to push and lay out chicken wire. Once we detached the trailer and fitting it with a harness of chains pulled it by hand, but mostly the Buick had to pull it. In such manner we worked all night as we could not have done in the heat of the day. At 2 A.M. the Buick's clutch began to slip badly, and while Upton and I stopped to fix it, everybody else dropped in his tracks wherever he happened to stand and fell instantly asleep upon the sand. All we could do was to sprinkle the clutch with talcum powder, and then we too fell asleep. By daylight we were up and off, with only a hasty sandwich for breakfast, for well we knew that the overpowering rays of the sun would soon make such labor unendurable, and that many weary miles lay ahead between us and water. It appeared that the Buick with the trailer behind would come through best at full speed in second gear. Traveling this way when it hit a sand drift it would plough through it, shooting the sand to one side in a cloud like a rotary plow coming through a snowdrift. How blessed at last seemed the irrigation ditch which marked the end of the sand and the outskirts of the Imperial Valley. What a luxury to get out by the bridge and catch some Philanthidæ on the flowers growing by the bank!

In the desert that morning we made one of the notable lizard captures of the trip, obtaining specimens of the rare *Callisaurus notatus,* a sand gray species, its back mottled with black spots. The previous evening west of Yuma, we obtained an uncommon scaly lizard of the genus *Uta,* related to our eastern *Sceloporus;* it was the long-tailed *Uta, U. graciosa.* Another specimen was captured crossing the sand in the early morning. One of the most conspicuous features of the desert fauna is the gridiron-tailed lizard, *Holbrookia texana,* and another species which very closely resembles it, *Callisaurus ventralis ventralis.* Both of these have long tails barred alternately black and white, and have the habit of standing erect on their toes, tail aloft, and scooting over the sand with amazing



Moro Rock in the Giant Forest, Sequoia National Park, California.

CLIFFS AT LA JOLLA. The mighty Pacific before us brought home the realization that we had spanned the continent from tidewater to sea.

celerity. The *Holbrookia* we obtained at various places from New Braunfels to Tucson, and the *Callisaurus* from the region on Tucson westward to Jacumba on the Pacific side of the Colorado Desert.

So our trip approached an end. From tidewater of the Atlantic we were soon to see the Pacific. Across the Imperial Valley lay the coast range of mountains. In both the collecting was good. I may especially mention the beautiful gigantic meloid, *Tegrodera erosa,* of which we found many near our camp at Warrens, August 13. Proceeding through Pine Valley, we reached the sea and camped at Torrey Pines on a beautiful point of land looking directly out over and high above the ocean. This was the night of August 14, seventy-eight days after leaving tidewater on the Chesapeake. In the morning we skirted the sea northward to Laguna, camping by the seaside laboratory of Pomona College, bade welcome by the kindly hospitality of Dr. Hilton. Here the writer had to leave the party, and he must leave for others to tell of the trip northward to Berkeley, and the several days' stay at Alta Meadow, 9,000 feet up in the high Sierras, and the wonders of the Giant Forest and Sequoia National Park. The trip, totaling about 6,100 miles, ended for all at Berkeley, August 30, 1917, ninety-nine days from the time we left Ithaca.